REMARKS

Claims 1-5, 9, 11-15, 18-23, and 27 remain in the present application. Claims 6-8, 10, 16-17, and 24-26 were previously canceled without prejudice. Claims 1, 4, 5, 9, 12, 18, 20, 22, and 27 are hereby amended. No new matter is being added.

Claims Rejections

Claims 1-5, 9, 11-15, 18-23, and 27 stand rejected under 35 USC 103(a) as being unpatentable over Yin et al (USP 6,844,550) in view of Chang et al ("Multiple electron-Beam Lithography"). Applicant respectfully traverses this rejection with respect to the claims as now amended.

Claim 1, as amended, now recites as follows.

> 1. A method for inspecting portion of a substrate to be inspected, the method comprising:
> generation of N multi-pixel incident electron beams;
> directing the N multi-pixel incident electron beams through N beam separators in a first direction;
> focusing the N multi-pixel incident electron beams onto **N beam spots** on the substrate, wherein **multiple pixels are included within each beam spot**;
> directing electrons emitted from the N beam spots through the N beam separators in a second direction so as to separate the emitted electrons from the incident beams;
> detecting the emitted electrons using N multi-pixel detector arrays, wherein **each detector array detects multiple pixels from one of the beam spots in a parallel manner**; and
> translation of the substrate in a path that covers approximately 1/N of the portion of the substrate to be inspected.
>
> (Emphasis added.)

As now explicitly recited in amended claim 1, the claimed method requires "N beam spots" and that "multiple pixels are included within each beam spot". In addition, the claimed method is further limited such that "each detector array detects multiple pixels from one of the beam spots in a parallel manner".

These limitations are supported in the original specification. For example, FIG. 6 illustrates the inspection process by which N beam spots, each with multiple pixels, are directed onto the substrate under inspection. For convenience of reference, FIG. 6 is reproduced below.

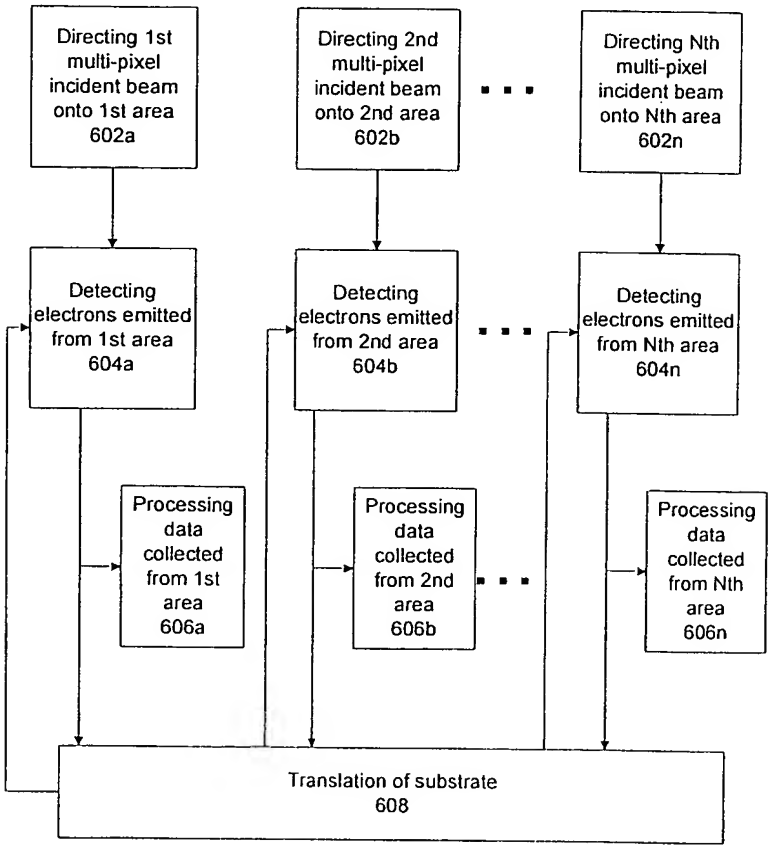

FIG. 6 600

In further support of **multiple pixels within each beam spot**, page 8, line 27 through page 9, line 2, of the original specification recites as follows.

> In contrast to a typical scanning electron microscope type apparatus where a single-pixel beam is scanned across an area, the apparatus 550 impinges four multiple-pixel incident beams (504a, 504b, 504c and 504d) onto the specimen. **This is advantageous in that data may be obtained from multiple pixels in parallel within each beam spot.** Moreover, the use of four such multi-pixel beams (instead of just one multi-pixel beam) further increases the efficiency such that the throughput of an inspector may be further improved by approximately a factor of four.
>
> (Emphasis added.)

In further support of **each detector array detecting multiple pixels in a parallel manner from each beam spot**, page 10, lines 22-26, of the original specification recites as follows. "In a preferred embodiment, such detection is advantageously performed **in a parallel manner for** both the N beam spots and **the multiple pixels within each beam spot**." (Emphasis added.) In addition, page 9, lines 22-23, states, "Each multi-pixel detection system may be implemented, for example, with a charged-coupled device (CCD) array or other type of detector array."

In contrast to the claimed invention, Yin et al teaches multiple incident electron beamlets (one per column), where each beamlet is focused onto a **small (single pixel) spot** that is **raster scanned** across the surface. For example, Yin et al states as follows regarding each electron optical column. "The focusing electrodes focus the beam to a **small spot** on the wafer while the scanning deflectors 240 & 245 scan the beam over the wafer 280 in a **raster scan**. The secondary electrons created by the primary beam are captured by the SE detectors 270." (Column 6, lines 16-20, emphasis added.) The conventional

secondary electron (SE) detector 270 in Yin et al is not a CCD or other detector array which detects multiple pixels within a beam spot in a parallel manner.

Chang et al teaches multiple electron beam approaches to lithography. Chang et al does not pertain to electron-emission inspection which is a distinct field with different issues than electron-beam lithography.

Furthermore, Chang et al does not teach the advantageous data collection where **multiple pixels are collected per beam spot for multiple beam spots**. For example, under the multiple columns approach, Chang et al states, "Each column contains a single Schottky source and a beam-forming, blanking and deflection system to produce a **focused beam** to perform the exposure." (Chang et al, page 2, lines 7-9, emphasis added.) Under the single column with multiple-source arrays approach, **individual beamlets** are formed along a single column axis. "This is a single-axis system, and the spacing between the beamlets at the wafer is relatively small--on the order of micrometers. By suitably increasing the beamlet spacing, e-e interactions can be reduced." (Chang et al, page 2, lines 23-26.)

Hence, as discussed above, neither Yin et al, nor Chang et al, nor the combination thereof, disclose or teach the claimed invention in amended claim 1. As such, applicant respectfully submits that claim 1 is patentable over the cited art.

Claims 2-3 depend from claim 1. As such, claims 2-3 are patentable over the cited references for at least the same reasons as discussed above in relation to claim 1.

Similar to claim 1, independent claim 4 is amended and now explicitly recites that "multiple pixels are included within each beam spot" and that "each said detector is configured to detect the multiple pixels in parallel from electrons

emitted from one of the beam spots". Hence, for at least the reasons discussed above in relation to claim 1, claim 4 is now also distinguished over the cited art.

Claim 5 depends from claim 4. As such, claim 5 is patentable over the cited references for at least the same reasons as discussed above in relation to claim 4.

Similarly, independent claim 9 is amended and now explicitly recites that "each detector array detects multiple pixels from one of the beam spots in a parallel manner". Hence, for at least the reasons discussed above in relation to claim 1, claim 9 is now also distinguished over the cited art.

Claims 11-15 and 18-19 depend from claim 9. As such, claims 11-15 and 18-19 are patentable over the cited references for at least the same reasons as discussed above in relation to claim 9.

Similarly, independent claim 20 is amended and now explicitly recites that "a first multiple-pixel beam spot" and "a second multiple-pixel beam spot." In addition, claim 20 recites "a first multiple-pixel electron detector configured to detect in parallel pixels of the first multi-pixel emitted beam" and "a second multiple-pixel electron detector configured to detect in parallel pixels of the second multi-pixel emitted beam". Hence, for at least the reasons discussed above in relation to claim 1, claim 20 is now also distinguished over the cited art.

Claims 21-23 and 27 depend from claim 20. As such, claims 21-23 and 27 are patentable over the cited references for at least the same reasons as discussed above in relation to claim 20.

Conclusion

Applicants respectfully submit that claims 1-5, 9, 11-15, 18-23, and 27, as amended, are now in patentable form. Favorable action is respectfully requested.

Respectfully submitted,
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